

Stocks and Stock Valuation

1. Preferred Stocks

2. Common Stocks

1. Preferred Stocks

1.1. Preferred stock is a **Hybrid**; it is similar to bonds in some respects and to common stock in others.

Preferred stock has a par value and a fixed amount of dividends that must be paid before dividends can be paid on the common stock. However, if the preferred dividend is not earned, the directors can omit it without throwing the company into bankruptcy. So, although preferred stock has a fixed payment like bonds, a failure to make this payment will not lead to bankruptcy.

1.2. The holder of the Preferred Stocks does not have the voting right like the holder of the common stock.

1.3. The Value of Preferred Stock depends on 2 factors

- A. The amount of annual dividends (which is fixed amount according to fixed rate)
- B. The required rate of return which is function of (RFR + Risk premium)

$\text{Value } (P_S) = \frac{\text{Dividends}}{\text{RRR}}$

Example (1)

A preferred stock \$10 par value, 10% dividend (this amount is fixed) what is the value of the share if the required rate of return is equal 11%.

Answer

$$\text{Value} = \frac{\text{Dividends}}{\text{RRR}}$$

$$\text{Value } P_S = \frac{10 \times 10\%}{0.11} = \frac{1}{0.11} = \$ 9.09$$

Example (2)

Fee Founders Has Preferred Stock Outstanding Which Pays A Dividend Of \$5 At The End Of Each Year. The Preferred Stock Sells For \$60 A Share. What Is the Preferred Stock's Required Rate of Return?

Answer:

$$\text{Value} = \frac{\text{Dividends}}{\text{RRR}}$$

$$60 = \frac{\$5}{RRR}$$

$$RRR = \frac{5}{60} \times 100 = 8.33\%$$

Example (3)

What will be the nominal rate of return on a preferred stock with a \$100 par value, a stated dividend of 8 percent of par, and a current market price of (a) \$60, (b) \$80, (c) \$100, and (d) \$140?

Answer:

$$\text{Dividend} = 100 \times 8\% = \$8$$

$$\text{Value} = \frac{\text{Dividends}}{RRR}$$

$$\text{A) - RRR @ \$60} = \frac{8}{60} \times 100 = 13.33\%$$

$$\text{B) - RRR @ \$80} = \frac{8}{80} \times 100 = 10\%$$

$$\text{C) - RRR @ \$100} = \frac{8}{100} \times 100 = 8\%$$

$$\text{D) - RRR @ \$140} = \frac{8}{140} \times 100 = 5.71\%$$

Example (4)

Ezzell Corporation issued preferred stock with a stated dividend of 10 percent of par. Preferred stock of this type currently yields 8 percent, and the par value is \$100. Assume dividends are paid annually.

A. What is the value of Ezzell's preferred stock?

B. Suppose interest rate levels rise to the point where the preferred stock now yields 12 percent. What would be the value of Ezzell's preferred stock?

Answer:

$$\text{Dividend} = 100 \times 10\% = \$10$$

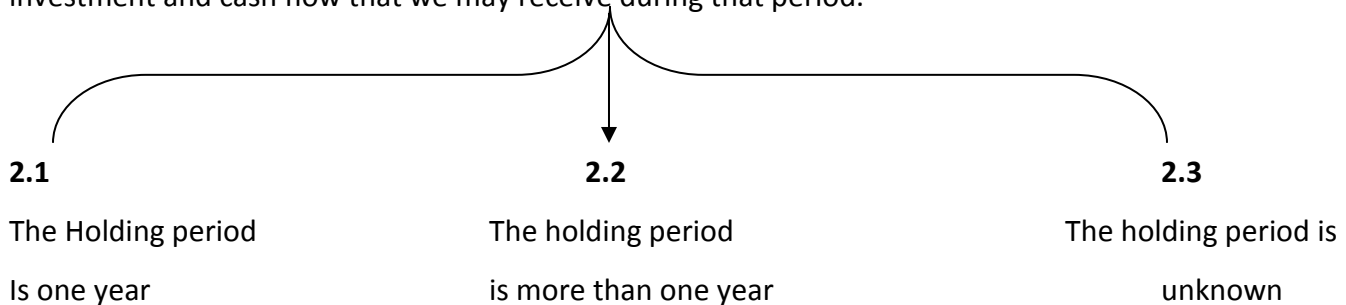
$$\text{Value} = \frac{\text{Dividends}}{RRR}$$

$$P = \frac{10}{0.08} = \$ 125$$

$$P = \frac{10}{0.12} = \$ 83.33$$

2. Common Stocks

The problem of a common stock is that the amount of dividends, earning or cash flow of return is not fixed and there is no maturity, therefore we need to set several assumptions related to the holding period of the investment and cash flow that we may receive during that period.



2.1 The Holding period is one year

The cash that may be received is dividend for one year and selling price of the stock at the end of that year.

Example (5)

XYZ Company has a share that is expecting to pay \$1 dividend next year and to be sold at \$30 by the end of that year, what is the value of XYZ stock if the required rate of return is 14%.

Answer

Today	→	Dividend (D_1) = \$ 1
		Selling price = \$ 30

FV		\$ 31

$$\text{Price (PV)} = \frac{\text{FV}}{1 + \text{RRR}}$$

$$\text{Price (PV)} = \frac{31}{1.14} = \$ 27.19$$

2.2. The Holding Period is more than one year

In this case we need to estimate dividends for the next years also the expected growth rate in that dividends during the coming holding period and the selling price at the end of that period.

Example (6)

ABC's share is expecting to pay \$2 dividend next year while the dividends of this stock will grow by 10% each year, ABC Share is expected to be sold at the end of 3 years for amount of \$40, what is the value of ABC stock if the required rate of return is 14%.

Answer

Y ₀	Y1	Y2	Y3
Dividend	2 10% →	2.20 10% →	2.42
Selling Price			40
Total	2	2.20	42.42

$$\text{Price (PV)} = \frac{2}{1.14} + \frac{2.20}{(1.14)^2} + \frac{42.42}{(1.14)^3} =$$

$$\text{Price (PV)} = 1.7544 + 1.6928 + 28.6331 = \$ 32.08$$

2.3. The holding period is unknown

In this case the company will be in the mature stage then it will enjoy a constant growth rate.

Example (7)

ABC's share is expecting to pay \$ 3 dividends next year while it is expected to have a constant growth rate for 5 %, what is the value of ABC stock if the required rate of return is 15%.

Answer

$\text{Value} = \frac{\text{Dividends}}{\text{RRR} - g} = P_0 = \frac{D_1}{\text{RRR} - g}$

$g \rightarrow$ Growth rate

$$V = \frac{3}{0.15 - 0.05} = \$ 30$$

Example (8)

ABC's share is expecting to pay \$ 2 dividends next year while it is expected to have a constant growth rate for 10 % annually for the coming 2 years then it will fall to 4 % constantly, what is the value of ABC stock if the required rate of return is 14%.

Answer:

Y ₀	Y1	Y2	Y3	Y4
Dividend	2	2.20	2.42	2.52
		10%	10%	4%
				Constant Growth
Selling Price			25.20	
Total	2	2.20	27.62	

$$P_3 = \frac{D_4}{RRR - g}$$

$$P_3 = \frac{2.52}{0.14 - 0.04} = \$ 25.20$$

$$\text{Price (PV)} = \frac{2}{1.14} + \frac{2.20}{(1.14)^2} + \frac{27.62}{(1.14)^3} =$$

$$\text{Price (PV)} = 1.75 + 1.69 + 18.64 = \$ 22.08$$

Variables & Relationship that affect the value of common stock

$$P_0 = \frac{D_1}{RRR - g}$$

Variables

$D_1 \rightarrow$ Dividend which is affected by level of earning

$RRR \rightarrow$ required rate of return which is affected by (Risk free rate + Risk Premium)

$g \rightarrow$ Growth rate which is affected by payout ratio & earning

Relationship

There is positive relationship between dividend and value

There is negative relationship between required rate of return and value

There is a positive relationship between growth rate and value

Growth Rate (g) =

$$\text{Retention Rate (RR)} \times \text{(ROE)}$$

$$= (1 - \text{Payout Ratio}) \times \frac{\text{Net Income}}{\text{Equity}}$$

Example (9)

The records of ABC Company showing the following Data

Item	Amount
Sales	100 Million
Cost of Goods Sold (COGS)	50 Million
Book Value of ABC Share	\$ 10
Interest rate on Co's Debt	15%
Tax Rate	40%
Amount Of Debt	40 Million
No. of outstanding Shares	4 Million Shares
Risk Free Rate	10%
Market Risk Premium	25%
Beta	1.20
Payout Ratio	40%
The company is 50% Financed by Debt & 50% Equity	

From the given data, Please find the following:-

- The Required Rate of Return
- What is the Stock Value?

Answer

$$P_0 = \frac{D_1}{RRR - g}$$

$$RRR = RFR + (\text{Market Risk Premium}) \times \text{Beta}$$

$$RRR = 10\% + 25\% \times 1.20 = 40\%$$

In order to get the stock value we need to calculate g & D₁

Sales	100,000,000
(-) COGS	50,000,000
EBIT	50,000,000
(-) Interest (40,000,000 X 15%)	(-) 6,000,000
EBT	44,000,000
(-) Tax @ 40%	(-) 17,600,000
Net Income After Tax	26,400,000

Retention Rate (60%)
15,840,000

Pay Out Ratio (40%)
10,560,000 ÷
4,000,000 Shares
Dividend (D₀) = 2.64

$$g = RR \times ROE$$

$$ROE = \frac{\text{Net Income}}{\text{Equity}} \times 100$$

$$ROE = \frac{26,400,000}{40,000,000} \times 100 = 66\%$$

$$g = RR \times ROE$$

$$g = 60\% \times 66\% = 39.60\%$$

$$D_1 = D_0 \times (1+g)$$

$$D_1 = 2.64 \times (1.3960) = 3.69$$

$$P_0 = \frac{D_1}{RRR-g}$$

$$D_1 = 3.69$$

$$RRR = 40\%$$

$$g = 39.60\%$$

$$P_0 = \frac{3.99}{0.4000 - 0.3960} = \frac{3.69}{0.004} = \$ 92.25$$

Example (10)

The Record of **TATA** Industrial Company Showing the Following data:-

Sales Volume in Units	: 10,000,000 Units
Selling Price per Unit	: \$3
Variable Cost per Unit	: \$1
Total Fixed Cost	: \$ 1,000,000
Fixed Assets	: \$ 2,000,000
Depreciation Rate of Fixed Assets	: 5% per Annum
Risk Free Rate (RFR)	: 12%
Market Required Rate of Return	: 20%
Beta	: 1.20
Long Term Debt	: \$ 5,000,000 @ Interest Rate 15%
Number of Outstanding Shares	: 1,000,000 Shares
Share Price (Book Value)	: \$30
Tax Rate	: 35%
Payout Ratio	: 50%

From the Above Mentioned Data, Find the Following:-

1. Sales Revenue in Dollars
2. Total cost **COGS**= (Variable + Fixed + Depreciations)
3. Earnings Before Interest and tax (**EBIT**)
4. Return on Equity (**ROE**)
5. Required Rate of Return (**RRR**)
6. Dividend for Current Year (**D₀**)
7. Calculate Growth Rate (**g**)
8. Dividend For Next Year (**D₁**)
9. Find the Value of ABC Share
10. If Share is traded in the stock Market at \$250, what is your decision as investor and why?

Answer:

$$RRR = RFR + (R_M - RFR) \times \text{Beta}$$

$$RRR = 12 + (20 - 12) \times 1.20 = 21.60\%$$

$$\text{Sales} = \text{no. of units} \times \text{Selling Price}$$

$$\text{Sales} = 10 \text{ Million} \times 3 = 30 \text{ Million}$$

$$\text{Variable cost} = \text{No. of Units} \times \text{Variable cost Per Unit}$$

$$\text{Variable Cost} = 10 \text{ Million} \times 1 = 10 \text{ Million}$$

$$\text{Depreciation} = \text{Fixed Assets} \times \text{Depreciation Rate}$$

$$\text{Depreciation} = 2 \text{ Million} \times 5\% = 100,000$$

$$\text{Total cost } \text{COGS} = (\text{Variable} + \text{Fixed Cost} + \text{Depreciations})$$

$$\text{COGS} = 10\text{M} + 1\text{M} + 100,000 = 11,100,000$$

Sales	30,000,000
(-) COGS	11,100,000
EBIT	18,900,000
(-) Interest (5,000,000 X 15%)	(-) 750,000
EBT	18,150,000
(-) Tax @ 35%	(-) 6,352,500
Net Income After Tax	11,797,500

Retention Rate (50%)
5,898,750

Pay Out Ratio (50%)
5,898,750 ÷
1,000,000 Shares
Dividend (D_0) = 5.90

$$g = RR \times ROE$$

$$ROE = \frac{\text{Net Income}}{\text{Equity}} \times 100$$

$$\text{Equity} = 1,000,000 \times 30 = 30,000,000$$

$$ROE = \frac{11,797,000}{30,000,000} \times 100 = 39.32\%$$

$$g = RR \times ROE$$

$$g = 50\% \times 39.32\% = 19.66\%$$

$$D_1 = D_0 \times (1+g)$$

$$D_1 = 5.90 \times (1.1966) = 7.06$$

$$P_0 = \frac{D_1}{RRR-g}$$

$$D_1 = 7.06$$

$$RRR = 21.60\%$$

$$g = 19.66\%$$

$$P_0 = \frac{7.06}{0.2160 - 0.1966} = \frac{7.06}{0.0194} = \$ 363.92$$

Since the Fair value of the stock is approximately is \$364 while it is traded at \$250 (Under Price) , Therefore my decision as investor is to purchase TATA stock as it has a potential to move up to \$ 364 and achieve capital gain.

Bonds & Bond Valuation

What is the Bond?

A bond is a long-term contract under which a borrower agrees to make payments of interest and principal, on specific dates, to the holders of the bond. In another word bond represent a long term debt from issuer's point of view and a security from holder's point of view.

The value of the bond is affected by the following:-

- **Face value:** → which will be repaid back at maturity date
- **Coupon Rate:** → interest rate of the bond and compared to market rate
- **Tenor :** → No. of Years till maturity

Illustrative Example:

On January, 2003, ABC co. borrowed \$50 Million by issuing bonds over 10 years, Face Value \$1000 @ 6% coupon rates per annum. In exchange it promised to make annual interest payments and to repay the \$50 Million on a specified maturity date (January 2013, which is after 10 Years).

Bonds are classified into four main types: Treasury, corporate, municipal, and foreign.

1. Treasury Bonds

Treasury Bonds referred to government bonds since it's issued by the U.S. federal government. It is reasonable to assume that the federal government will make good on its promised payments, so these bonds have *no default risk*. Because it is guaranteed by federal government however Value of the bonds itself May be decline when interest rates rise in the market.

2. Corporate Bonds

Corporate bonds indicate that bond is issued by corporations but corporate bonds are exposed to default risk if the issuing company gets into trouble or Bankruptcy, it may be unable to make the promised interest and principal payments. Different corporate bonds have different levels of default risk, depending on the issuing company's characteristics and the terms of the specific bond. Default risk often is referred to as "**Credit Risk**" the larger the default or credit risk, the higher the interest rate the issuer must pay.

3. Municipal Bonds (Munis)

Municipal bonds are issued by state and local governments. Like corporate bonds, have default risk. However, (Munis) offer one major advantage over all other bonds: the interest earned on most municipal bonds is

exempt from federal taxes and also from state taxes if the holder is a resident of the issuing state consequently, municipal bonds carry interest rates that are considerably lower than those on corporate bonds with the same default risk.

4. Foreign Bonds

Foreign Bonds are issued by foreign governments or foreign corporations so foreign corporate bonds are exposed to default risk, in addition to currency risk if the bonds are denominated in a currency other than that of the investor's home currency. For example, if a U.S. investor purchases a corporate bond denominated in Japanese yen and the yen subsequently falls relative to the dollar, then the investor will lose money, even if the company doesn't default on its bonds.

Key Features of a Bond

1. **Par value:** Face value of the bond i.e. amount that be paid at maturity date.
2. **Coupon:** Stated interest rate Multiply by face value to get dollars of interest
(Coupon could be Fixed or Floating but generally is fixed)
3. **Maturity:** Number of years until bond must be repaid back.
4. **Issue date:** Date when bond was issued.
5. **Default Risk:** When the issuer will not be able to pay interest payment (Coupon) or Principal Payments.
6. **Callable Bonds:** when the interest rates decline in the market, the issuer may payback the value of the bonds before its maturity, therefore, borrowers are willing to pay more, and lenders require more, on callable bonds.

7. Redeemable Bond

A redeemable bond gives the investor the right to sell the bond back to the issuing company at a previously specified price. This is a useful feature (for investors) if interest rates rise or if the company engages in unanticipated risky activities.

8. Convertible Bonds

Convertible bonds are convertible into shares of common stock, at a fixed price, at the option of the bondholder. Convertibles have a lower coupon rate than non-convertible bond, but they offer investors a chance for capital gains in exchange for the lower coupon rate.

9. Call provision

Most corporate bonds contain a **Call Provision**, which gives the issuing corporation the right to call the bonds for redemption. The call provision generally states that the company must pay the bondholders an

amount greater than the par value if they are called. The additional sum, which is termed a **Call Premium**, is often set equal to one year's interest if the bonds are called during the first year, and the call premium decrease at a constant rate annually.

10. Sinking Funds Provision

Sinking fund provision facilitates to buy back the issued Bonds through 2 ways:-

- A. The company can call bonds for redemption at par value for a certain percentage of the Bonds each year according to serial number of bonds or by a lottery administered by the trustee. (Amortization).
- B. The company may buy the required number of bonds on the open market.

Bond Ratings Provide One Measure of Default Risk

Investment Grade					Junk Bonds			
Moody's	Aaa	Aa	A	Baa	Ba	B	Caa	C
S&P	AAA	AA	A	BBB	BB	B	CCC	D

Bond Ratings and Bond Spreads

Long-Term Bonds	Yield	Spread
U.S. Treasury	5.25%	
AAA	6.26	1.01%
AA	6.42	1.17
A	6.54	1.29
BBB	6.60	1.35
BB	7.80	2.55
B	8.42	3.17
CCC	10.53	5.28

Annuity

Annuity is a series of equal payments made at fixed intervals for a specified number of periods. For example, \$100 at the end of each of Month or year for the next three years, and they can occur at either the **Beginning** or the **End** of each period.

A. Ordinary Annuity

If the payments occur at the *end* of each period, the annuity is called an ordinary, or deferred, annuity.

B. Annuity due

If payments are made at the *beginning* of each period, the annuity is called an *annuity due*.

The Value of a Bond

The value of a bond is found as the present value of an annuity (the interest payments) plus the present value of (the principal). The bond is evaluated at the appropriate periodic interest rate over the number of periods for which interest payments are made.

Example (1)

ABC Company issued a bond with face value for \$1000, paid annual 10% coupon and 3 years to maturity, what is the value of ABC bonds today if the required rate of return is 12%.

Answer:

Coupon = $1000 \times 10\% = \$ 100$

$$PV = \frac{100}{(1.12)^1} + \frac{100}{(1.12)^2} + \frac{100}{(1.12)^3} + \frac{1000}{(1.12)^3}$$

Ordinary Annuity table

Interest = 12% & N= 3

PV table

Interest = 12% & N= 3

$$PV = 100 \times 2.40183 + 1000 \times 0.71178 =$$

$$PV = 240.18 + 711.78 = \mathbf{951.96 \approx \$ 952}$$

Suppose that maturity date is only 2 Years, what will be the value of ABC bond?

$$PV = \frac{100}{(1.12)^1} + \frac{100}{(1.12)^2} + \frac{1000}{(1.12)^2}$$

Ordinary Annuity Table

Interest = 12% & N= 2

PV Table

Interest = 12% & N= 2

$$PV = 100 \times 1.69005 + 1000 \times 0.79719$$

$$PV = 169 + 797.19 = \mathbf{\$ 966.19 \approx \$ 966}$$

Suppose that maturity date is only 1 Year, what will be the value of ABC bond?

$$PV = \frac{1100}{1.12} = 982.14 \approx 982$$

Suppose that maturity date is only 3 Years, but required rate of return is 8%, what will be the value of ABC bond?

$$PV = \frac{100}{(1.08)^1} + \frac{100}{(1.08)^2} + \frac{100}{(1.08)^3} + \frac{1000}{(1.08)^3}$$

Ordinary Annuity table

Interest = 8% & N= 3

PV table

Interest = 8% & N= 3

$$PV = 100 \times 2.57710 + 1000 \times 0.79383$$

$$PV = 257.71 + 793.83 = \$ 1051.54 \approx 1052$$

Suppose that maturity date is only 2 Years, but required rate of return is 8%, what will be the value of ABC bond?

$$PV = \frac{100}{(1.08)^1} + \frac{100}{(1.08)^2} + \frac{1000}{(1.08)^2}$$

Ordinary Annuity table

Interest = 8% & N= 2

PV table

Interest = 8% & N= 2

$$PV = 100 \times 1.78326 + 1000 \times 0.85734$$

$$PV = 178.33 + 857.34 = \$ 1035.67 \approx 1036$$

Suppose that maturity date is only 1 Year, but required rate of return is 8%, what will be the value of ABC bond?

$$PV = \frac{1100}{1.08} = \$ 1018.52 \approx 1019$$

When the RRR Decreased Value of the Bond Increased →

Required Rate of Return \ Years	RRR @ 12%	RRR @ 8%
3	952	1052
2	966	1036
1	982 (+)	1019 (-)
When we are approaching maturity date, The value of the bond will approach its Face Value		

Example (2)

ABC Company issued a bond with face value for \$1000, **Zero coupon** and 5 years to maturity, what is the value of ABC bonds today if the required rate of return is 12%.

Answer:

$$PV = \frac{1000}{(1.12)^5} = 1000 \times 0.56743 = \$ 567.43$$

Example (3)

ABC Company issued a bond with face value for \$1000, 6% **Semi Annual Coupon** and 2 years to maturity, what is the value of ABC bonds today if the required rate of return is 8%.

Answer:

$$\text{Coupon} = 1000 \times 6\% \times \frac{1}{2} = \$ 30$$

$$\text{RRR (Semi Annual)} = 8 \div 2 = 4\%$$

$$PV = \frac{30}{(1.04)^1} + \frac{30}{(1.04)^2} + \frac{30}{(1.04)^3} + \frac{30}{(1.04)^4} + \frac{1000}{(1.04)^4}$$

Ordinary Annuity Table

Interest = 4% & N= 4

$$PV = 30 \times 3.62990 + 1000 \times 0.85480$$

PV Table

Interest = 4% & N= 4

$$PV = 108.90 + 854.80 = \$ 963.70$$

Bond Yield to Maturity (YTM)

YTM is the rate of return earned on a bond held to maturity. Also called “promised yield.”

Example (4)

14 Years bond, 10% Coupon, \$ 1000 par value, bond price at \$1494.93 what is rate of interest would you earn on your investment if you held the bond till maturity?

Answer:

$$1494.93 = \frac{100}{(1+r)^1} + \frac{100}{(1+r)^2} + \dots + \frac{100}{(1+r)^{14}} + \frac{1000}{(1+r)^{14}}$$

We use trail & error or Financial Calculator we reach to 5%

To proof the Result

$$100 \times 9.89864 + 1000 \times 0.50507$$

$$989.86 + 505.07 = \$ 1494.93 \text{ (Which is equal to bond price)}$$

Bond Current Yield

It is the annual interest payment divided by the bond current value

Example (5)

A bond currently sells at \$ 985 and pay a coupon 10% what is the current yield?

Answer:

$$\text{Current yield} = \frac{100}{985} \times 100 = 10.15\%$$

Example (6)

Heath Foods’ bonds have 7 years remaining to maturity. The bonds have a face value of \$1,000 and a yield to maturity of 8 percent. They pay interest annually and have a 9 percent coupon rate. What is their current yield?

Answer:

$$PV = \frac{90}{(1.08)^1} + \frac{90}{(1.08)^2} + \dots + \frac{90}{(1.08)^7} + \frac{1000}{(1.08)^7}$$

Ordinary Annuity Table
Interest =8% & N= 7

PV Table
Interest = 8% & N= 7

$$\begin{aligned} PV &= 90 \times 5.20637 + 1000 \times 0.58349 \\ PV &= 468.57 + 583.49 = \$ 1052.06 \end{aligned}$$

$$\text{Current Yield} = \frac{90}{1052.06} \times 100 = 8.55\%$$

Example (7)

Callaghan Motors' bonds have 12 years remaining to maturity. Interest is paid annually, the bonds have a \$1,000 par value, and the coupon interest rate is 8 Percent. The bonds have a yield to maturity of 9 Percent. What is the current market price of these bonds?

Answer:

$$\text{Coupon} = 1000 \times 8\% = \$ 80$$

$$PV = \frac{80}{(1.09)^1} + \frac{80}{(1.09)^2} + \dots + \frac{80}{(1.09)^{12}} + \frac{1000}{(1.09)^{12}}$$

Ordinary Annuity Table
Interest = 9% & N= 12

PV Table
Interest = 9% & N= 12

$$\begin{aligned} PV &= 80 \times 7.16073 + 1000 \times 0.35553 \\ PV &= 572.86 + 355.53 = \$ 928.39 \end{aligned}$$

Challenging Example (8)

Suppose Ford Motor Company sold an issue of bonds with a 10-year maturity, a \$1,000 par value, a 10 percent coupon rate, and **Semiannual interest** payments.

A. Two years after the bonds were issued, the going rate of interest on bonds such as these fell to 6 percent.
At what price would the bonds sell?

B. Suppose that, 2 years after the initial offering, the going interest rate had risen to 12 percent. At what price would the bonds sell?

Answer:

$$\text{Coupon} = 1000 \times 10\% \times \frac{1}{2} = \$ 50$$

$$\text{Remaining Years till Maturity} = 10 - 2 = 8 \text{ years} = 8 \times 2 = 16 \text{ period}$$

$$\text{Interest (Paid Semi Annual)} = 6 \div 2 = 3 \%$$

A)-

$$\text{PV} = \frac{50}{(1.03)^1} + \frac{50}{(1.03)^2} + \dots + \frac{50}{(1.03)^{16}} + \frac{1000}{(1.03)^{16}}$$

Ordinary Annuity Table

Interest = 3% & N= 16

PV Table

Interest = 3% & N= 16

$$\begin{aligned} \text{PV} &= 50 \times 12.56110 + 1000 \times 0.62317 \\ \text{PV} &= 628.06 + 623.17 = \$ 1251.23 \end{aligned}$$

B) - Interest (Paid Semi Annual) = $12 \div 2 = 6 \%$

$$\text{PV} = \frac{50}{(1.06)^1} + \frac{50}{(1.06)^2} + \dots + \frac{50}{(1.06)^{16}} + \frac{1000}{(1.06)^{16}}$$

Ordinary Annuity Table

Interest = 6% & N= 16

PV Table

Interest = 6% & N= 16

$$\begin{aligned} \text{PV} &= 50 \times 10.1059 + 1000 \times 0.39365 \\ \text{PV} &= 505.30 + 393.65 = \$ 898.95 \end{aligned}$$

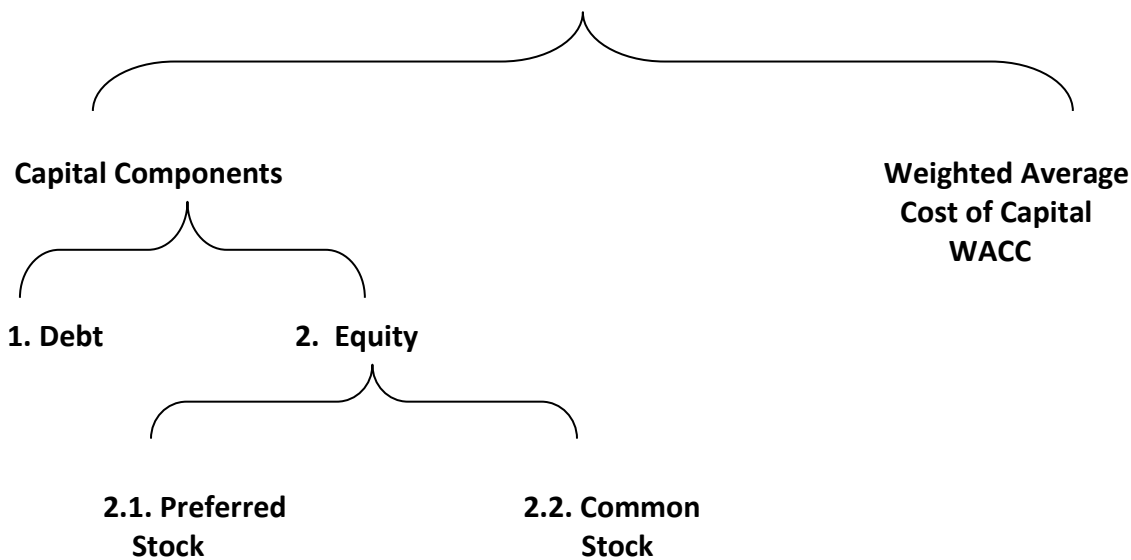
Cost of Capital

When investor providing the corporation with fund. Investor is expecting that firm will pay appropriate return as a compensation for providing such fund; this return is called cost of equity from the firm's point view. Most of the firms have different types of capital, called capital components or Capital Structure includes common stock, preferred stocks & Debt.

Importance of Cost of Capital

1. The cost of capital is considered as important factor in the Public/Government Corporation in order to calculate cost of the supplied utility service properly. Therefore the cost of capital is an important factor in the regulation of electric, gas, and telephone companies. These utilities are natural monopolies in the sense that one firm can supply service at a lower cost than could two or more firms. Because it has a monopoly, your electric or Telephone Company could, if it were unregulated, exploit (use) you. Therefore, regulators
 - A. Determine the cost of the capital investors have provided the utility
 - B. Then set rates designed to permit the company to earn its cost of capital, no more and no less.
2. Cost of capital is vital factor when we estimating the incremental cash flow that would result from Merger & acquisition and then discounted those cash flows at the estimated cost of capital. For example, **Vodafone Group** (Large Telecommunications Company in the United Kingdom) spent \$60 billion to acquire Air Touch Communications (U.S. Telecommunications company, in 1999). The resulting company, Vodafone Air Touch, later made a \$124 billion offer for Mannesmann (German company) in both cases, Vodafone estimated the incremental cash flows that would result from the acquisition, and then discounted those cash flows at the estimated **cost of capital**. The resulting values were greater than the targets' market prices, so Vodafone made the offers.
3. Cost of capital is essential factor since multinational companies are using the concept of economic value added (EVA) which is the difference between net operating profit after tax and charges for capital where the capital charges is calculated by multiplying the amount of capital by the cost of capital, thus the cost of capital is an important component.

Cost of Capital



1. Debt

Illustrative Example

Sales	: \$ 20 Million
COGS	: \$10 Million
Capital	: \$ 5 Million - Case 1 (100% Equity) – Case 2 (100% Debt)
Interest Rate on Debt	: 10%
Tax Rate	: 40%

	100% Equity	100% Debt	
Sales	20,000,000	20,000,000	
(-) COGS	10,000,000	10,000,000	
EBIT	10,000,000	10,000,000	
(-) Interest @10%	Zero	500,000	
EBT	10,000,000	9,500,000	
(-) TAX @ 40%	4,000,000	3,800,000	→ Tax Saving 200,000
Net Income	6,000,000	5,700,000	

Real effect of interest = 500,000 – 200,000 = \$ 300,000

Real effect interest Rate = $\frac{300}{5000} \times 100 = 6\%$

i.e. real effect of interest rate = 10% (1- tax Rate) =

$$10\% (1-40\%) = 10\% \times 60\% = 6\%$$

This means that:

$$\text{Cost of debt} = \text{Interest} (1-\text{Tax Rate})$$

Example (1)

Calculate the after-tax cost of debt under each of the following conditions:

- a. Interest rate, 13 percent; tax rate, 0 percent.
- b. Interest rate, 13 percent; tax rate, 20 percent.
- c. Interest rate, 13 percent; tax rate, 35 percent.

Answer

- A- Interest rate \times (1 – Tax rate) = 13 % (1 - 0) = 13.00%.
- B- = 13 % (0.80) = 10.40%.
- C- = 13 % (0.65) = 8.45%.

Example (2)

The Heuser Company's currently outstanding 10 percent coupon bonds have a yield to maturity of 12 percent. Heuser believes it could issue at par new bonds that would provide a similar yield to maturity. If its marginal tax rate is 35 percent, what is Heuser's after-tax cost of debt?

Answer

$$\begin{aligned}\text{Cost of Debt} &= \text{Debt} (1 - \text{tax rate}) \\ 12\% \times (1 - 0.35\%) &= 7.80\%\end{aligned}$$

Example (3)

LL Incorporated's currently outstanding 11% coupon bonds have a yield to maturity of 8% LL believes it could issue at par new bonds that would provide a similar yield to maturity. If its marginal tax rate is 35%, what is LL's after-tax cost of debt?

Answer

$$\begin{aligned}\text{Cost of Debt} &= \text{Debt} (1 - \text{tax rate}) \\ &= 8\% \times 0.65\% = 5.20\%\end{aligned}$$

2.1. Equity- Preferred Stock

$$\text{Cost of preferred Stock} = \frac{\text{Dividend}}{\text{Net Proceed}}$$

↓

Issued Price (–) Flotation cost (Issuing Cost)

Example (4)

ABC Company issued \$50 Million shares, par value worth for \$10 dollars, if the fixed dividends are 9% what is the cost of the preferred stock? If the issuing process cost the company \$ 2 Million

Answer

$$\text{Dividends} = 50,000,000 \times 9\% = \$ 4,500,000$$

$$\text{Net Proceeds} = 50,000,000 - 2,000,000 = \$ 48,000,000$$

$$\text{Cost of preferred Stock} = \frac{4,500,000}{48,000,000} \times 100 = 9.38 \%$$

2.2. Equity- Common Stock

Three methods typically are used

- (1) The Capital Asset Pricing Model (CAPM)
- (2) The discounted cash flow (DCF) method
- (3) The Bond yield-Plus Risk

CAPM

$$R_s = R_{FR} + \underbrace{(R_M - R_{FR})}_{\text{Market Risk Premium (RP}_M\text{)}} \text{ beta}$$

DCF

$$\text{Cost of common Stock (Rs)} = \frac{D_1}{P_0} + g$$

↓ ↓

Issued Price (–) Flotation cost (Issuing Cost) (ROE X RR)

Bond-Yield-Plus-Risk-Premium Approach

Some analysts use a subjective Premium to estimate a firm's cost of common stock; they simply add a judgmental risk premium of 3% to 5% to the interest rate on the firm's own long-term debt.

$$R_s = \text{Bond Yield} + \text{Risk Premium}$$

Example (5)

ABC Company issued 100 Million shares; par value worth for \$5 dollars, if the expected Dividends are 10% and growth rate on those dividends is 6%, if the issuing cost is \$40 Million, what is the cost of common stock?

Answer

$$\text{Dividends} = 100,000,000 \times 5 \times 10\% = \$ 50,000,000$$

$$\text{Net Proceeds} = 100,000,000 \times 5 - (500,000,000 - 40,000,000) = \$ 460,000,000$$

$$\begin{aligned} \text{Cost of Common Stock} &= \frac{D_1}{P_0} + g \\ &= \frac{50,000,000}{460,000,000} \times 100 + 6\% \\ &= 10.87\% + 6\% = 16.87\% \end{aligned}$$

Example (6)

NCC's stock sells for \$32, its next expected dividend is \$2.40, and its expected growth rate is 7 %, what is the cost of common stock.

Answer

$$\text{Cost of Common Stock} = \frac{D_1}{P_0} + g$$

$$R_s = \frac{2.40}{32} \times 100 + 7\%$$

$$R_s = 7.50 + 7\% = 14.50$$

Weighted Average Cost of Capital

WACC =

(Weight of debt X Cost Debt) + (Weight of Preferred Stock X Cost of Preferred
Stock) + (Weight of Common Stock X Cost of Common Stock)

Example (7)

ABC Company Has Total Investment worth for \$200 Million financed as follows:-

- 100 Million Common stock @15 % cost
- 60 Million Preferred stock @ 12% cost
- 40 Million Debt @ 10% cost – tax rate 20% what is the WACC?

Answer

		Weight
Common	100,000,000	50%
Preferred	60,000,000	30%
Debt	40,000,000	20%
	=====	=====
Total	200,000,000	100%

$$\text{WACC} = (50\% \times 15\%) + (30\% \times 12\%) + [20\% \times 10\% (1 - 20\%)]$$

$$\text{WACC} = 7.50\% + 3.60\% + 1.60\% = 12.70\%$$

Example (8)

Longstreet Communications Inc. (LCI) has the following capital structure, which it considers to be optimal: **Debt 25%, Preferred Stock, 15%, and Common Stock 60%**. LCI's tax rate is 40% and investors expect earnings and dividends to grow at a constant rate of 6% in the future. LCI paid a dividend of \$3.70 per share last year (D_0) and its stock currently sells at a price of \$60 per share. Treasury bonds yield 6%, The Market Risk Premium is 5%, and LCI's beta is 1.3 these terms would apply to new security offerings.

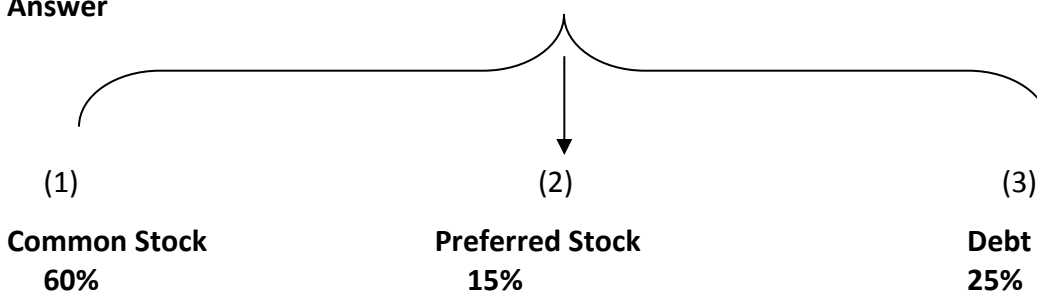
Preferred: New preferred could be sold to the public at a price of \$100 per share, with a dividend of \$9. Flotation costs of \$5 per share would be incurred.

Debt: Debt could be sold at an interest rate of 9%.

A. Find the component costs of debt, preferred stock, and common stock. Assume LCI does not have to issue any additional shares of common stock.

B. What is the WACC?

Answer



$$g = 6\%$$

$$D_0 = 3.70$$

$$P_0 = 60$$

1. Calculation for Common Stock

A. According DCF

$$\text{Cost of Common Stock} - R_s = \frac{D_1}{P_0} + g$$

$$D_1 = D_0 \times (1+g)$$

$$D_1 = 3.70 \times 1.06 = 3.92$$

$$R_s = \frac{3.92}{60} \times 100 + 6\%$$

$$R_s = 6.53\% + 6\% = 12.53\%$$

B. According to CAPM

$$R_s = RFR + \underbrace{(R_M - RFR)}_{\text{Risk Premium}} \text{ beta}$$

Risk Premium

$$R_s = 6\% + 5\% \times 1.30 = 12.50\%$$

2. Preferred Stock

$$\text{Cost of Preferred Stock} = \frac{\text{Dividend}}{\text{Net Proceed}}$$

$$R_{PS} = \frac{9}{100-5} \times 100 = 9.47\%$$

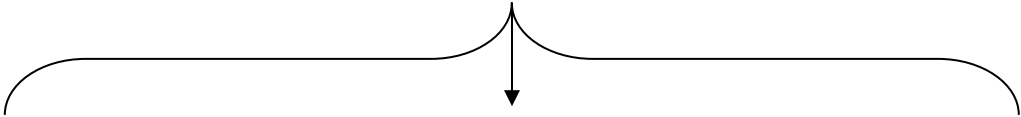
3. Debt

$$\text{Cost of debt} = \text{interest} (1 - \text{Tax Rate})$$

$$R_D = 9\% \times (1 - 0.40) = 5.40\%$$

WACC =

(Weight of debt X Cost Debt) + (Weight of Preferred Stock X Cost of Preferred
Stock) + (Weight of Common Stock X Cost of Common Stock)



	Common Stock	Preferred Stock	Debt
Weight	60%	15%	25%
Cost	12.53%	9.47%	5.40%

$$\text{WACC} = (25\% \times 5.40\%) + (15\% \times 9.47\%) + (60\% \times 12.53\%)$$

$$\text{WACC} = 1.35\% + 1.42\% + 7.52\%$$

$$\text{WACC} = 10.29\%$$

Challenging Example (9)

On January 1, the total market value of the Tysseland Company was \$60 Million. During the year, The Company plans to raise and invest **\$30 Million in New Projects**. The firm's Present Market value Capital Structure, Shown below, is considered to be optimal. Assume that there is no short-term debt.

Debt	\$30,000,000
Common equity	<u>\$30,000,000</u>
Total Capital	\$60,000,000

New bonds will have an 8 % coupon rate, and they will be sold at par. Common stock is currently selling at \$30 a share. Stockholders' required rate of return is estimated to be 12 percent, consisting of a dividend yield of 4 percent and an expected constant growth rate of 8 percent. (The next expected dividend is \$1.20, so $\$1.20/\$30 = 4\%$.) The corporate tax rate is 40 %.

A. To maintain the Present capital structure, how much of the new investment must be financed by common equity?

B. Assume that there is sufficient cash flow such that Tysseland can maintain its target capital structure without issuing additional shares of equity. What is the WACC?

Answer

A) - In order to keep same percentage of the capital structure (which is 50% & 50%); we need to divide the new \$ 30 Million between Equity & Debt with same Percentage. So

New investment must be financed by common Equity = 30 Million X 0.50 = \$ 15 Million

B)-

$$P_0 = 30$$

$$g = 8\%$$

$$D_1 = 1.20$$

$$\text{Tax} = 40\%$$

$$\text{Bond Coupon} = 8\%$$

$$\text{Cost of Common Stock } R_S = \frac{D_1}{P_0} + g$$

$$R_S = \frac{1.20}{30} \times 100 + 8\% = 4\% + 8\% = 12\%$$

$$\text{Cost Of Debt} = 8\% (1 - 0.40\%) = 4.80\%$$

$$\text{WACC} = (50\% \times 12\%) + (50\% \times 4.80\%)$$

$$\text{WACC} = 6\% + 2.40\% = 8.40\%$$

Capital Structure

Is mix of debt and Equity that maximizes the stock price?

How dose capital structures affect the value of the firm?

$$\text{Value of the Firm} = \frac{\text{FCF}}{1 + \text{WACC}}$$

The value of a firm is the present value of its expected future free cash flow (FCFs), discounted at its weighted average cost of capital (WACC).

Example

ABC Company showing the Following Capital Structure (Tax Rate 40%)

Ser.	Debt%	Cost Of Debt	Equity%	Cost of Equity	WACC
1	0%	8%	100%	10%	10%
2	10%	8%	90%	10%	9.48%
3	20%	8%	80%	10%	8.96%
4	30%	8%	70%	10%	8.44%
5	40%	8%	60%	10%	7.92%
6	50%	8%	50%	10%	7.40%
7	60%	8%	40%	10%	6.88%
8	70%	8%	30%	10%	6.66%
9	80%	8%	20%	10%	5.84%
10	90%	8%	10%	10%	5.32 %
11	100%	8%	0 %	10%	4.80%

$$\text{WACC} = (\text{Weight of Debt} \times \text{Cost Debt} \times (1 - \text{Tax Rate})) + (\text{Weight Equity} \times \text{Cost of Equity})$$

Since WACC is depending on the Percentage of Debt and Equity, therefore the capital structure will affect the value of the Firm.

1. $WACC = 0\% \times 8\% \times 60\% + 100\% \times 10\% = 0 + 10\% = 10.00\%$
2. $WACC = 10\% \times 8\% \times 60\% + 90\% \times 10\% = 0.48\% + 9\% = 9.48\%$
3. $WACC = 20\% \times 8\% \times 60\% + 80\% \times 10\% = 0.96\% + 8\% = 8.96\%$
4. $WACC = 30\% \times 8\% \times 60\% + 70\% \times 10\% = 1.44\% + 7\% = 8.44\%$
5. $WACC = 40\% \times 8\% \times 60\% + 60\% \times 10\% = 1.92\% + 6\% = 7.92\%$
6. $WACC = 50\% \times 8\% \times 60\% + 50\% \times 10\% = 2.40\% + 5\% = 7.40\%$
7. $WACC = 60\% \times 8\% \times 60\% + 40\% \times 10\% = 2.88\% + 4\% = 6.88\%$
8. $WACC = 70\% \times 8\% \times 60\% + 30\% \times 10\% = 3.66\% + 3\% = 6.66\%$
9. $WACC = 80\% \times 8\% \times 60\% + 20\% \times 10\% = 3.84\% + 2\% = 5.84\%$
10. $WACC = 90\% \times 8\% \times 60\% + 10\% \times 10\% = 4.32\% + 1\% = 5.32\%$
11. $WACC = 100\% \times 8\% \times 60\% + 0\% \times 10\% = 4.80\% + 0\% = 4.80\%$

The Effect of Debt (on various Factors)

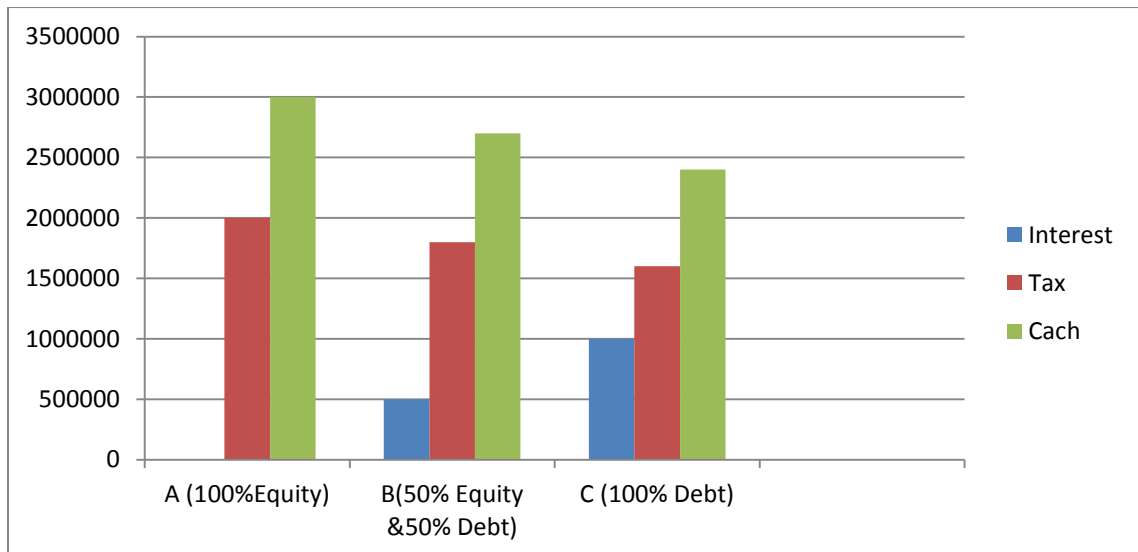
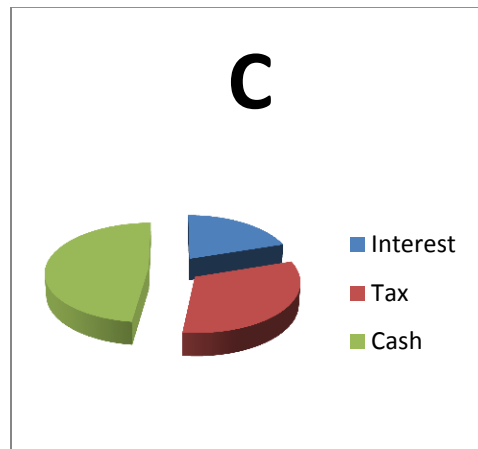
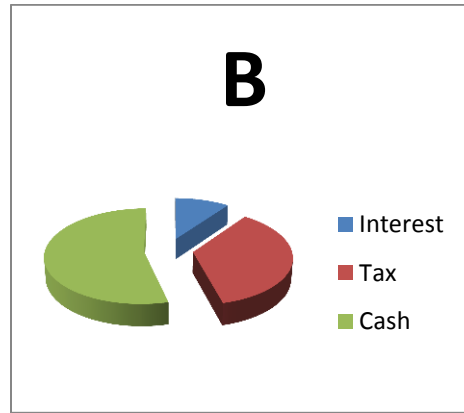
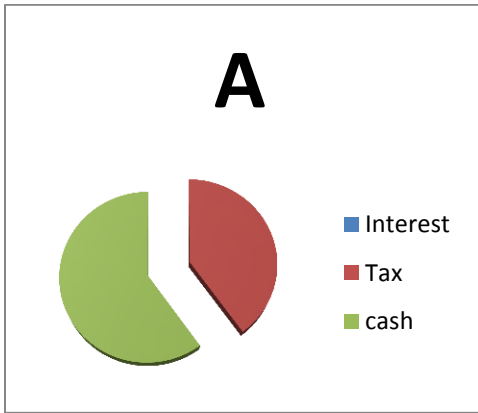
1. Debt Reduces Payment of Taxes (Positive impact on FCF)

Capital =10 Million – Interest Rate 10% - Tax 40%

	100% Equity	50% & 50%	100% Debt
	A	B	C
Sales	10,000,000	10,000,000	10,000,000
(-) COGS	5,000,000	5,000,000	5,000,000
EBIT	5,000,000	5,000,000	5,000,000
(-) Interest	Zero	500,000	1,000,000
EBT	5,000,000	4,500,000	4,000,000
TAX @40%	2,000,000	1,800,000	1,600,000
Net Income	3,000,000	2,700,000	2,400,000

Imagine that a company's cash flows are a pie, and three different groups get pieces of

The pie, the first sector goes to the government in the form of taxes, the second goes to debt holders, and the third to shareholders.



2. Additional debt increases the Probability of Bankruptcy.

A. Direct costs: Legal Fees, "Fire" Sales, etc.

B. Indirect costs: Lost customers, Reduction in productivity of managers and line workers, reduction in credit offered by suppliers. Therefore loss of customers and drop in productivity will lead to reduction in net operating profit after taxes (NOPAT) = EBIT (1- Tax)

C. Trade off Theory

Modigliani and Miller (MM's) developed trade- off theory of capital structure they assume that firm trade off the benefits of debt (Tax saving) and the bankruptcy cost.

However, in practice bankruptcy can be quite costly. Firms in bankruptcy have very *high legal and accounting expenses*, and they also have a hard time retaining customers, suppliers, and employees. Moreover, bankruptcy often forces a firm to liquidate or sell assets for less than they would be worth if the firm were to continue operating.

3. Additional debt can affect the Behavior of Managers (Agency Cost)

When time is good, managers may waste cash flow on Privileges and Non-necessary expenditures which lead to increases the agency costs however additional debt will make manager feel the threat of bankruptcy which makes them work hard and reduces such wasteful spending, which mean increases in FCF.

4. Issuing debt Convey Positive Signal while issuing Equity Convey Negative signal to the Marketplace

Managers are in a better position to forecast a company's free cash flow than are investors, and academics calling this **informational asymmetry**. Suppose a company's stock price is \$50 per share. If managers are willing to issue new stock at \$50 per share, investors reason that no one would sell anything for less than its true value. Therefore, the true value of the shares as seen by the managers with their superior information must be less than \$50. Thus, investors perceive an equity issue as a negative signal, and this usually causes the stock price to fall.

5. Issuing Debt will reduce WACC

Business Risk & Financial Risk

When we examined risk from the viewpoint of a stock investor, we distinguished between *market risk*, which is measured by the firm's beta coefficient, and *stand-alone risk*, which includes both market risk and an element of risk that can be eliminated by diversification.

Now we introduce two new dimensions of risk:

A. Business Risk: or the riskiness of the firm's stock if it uses no debt

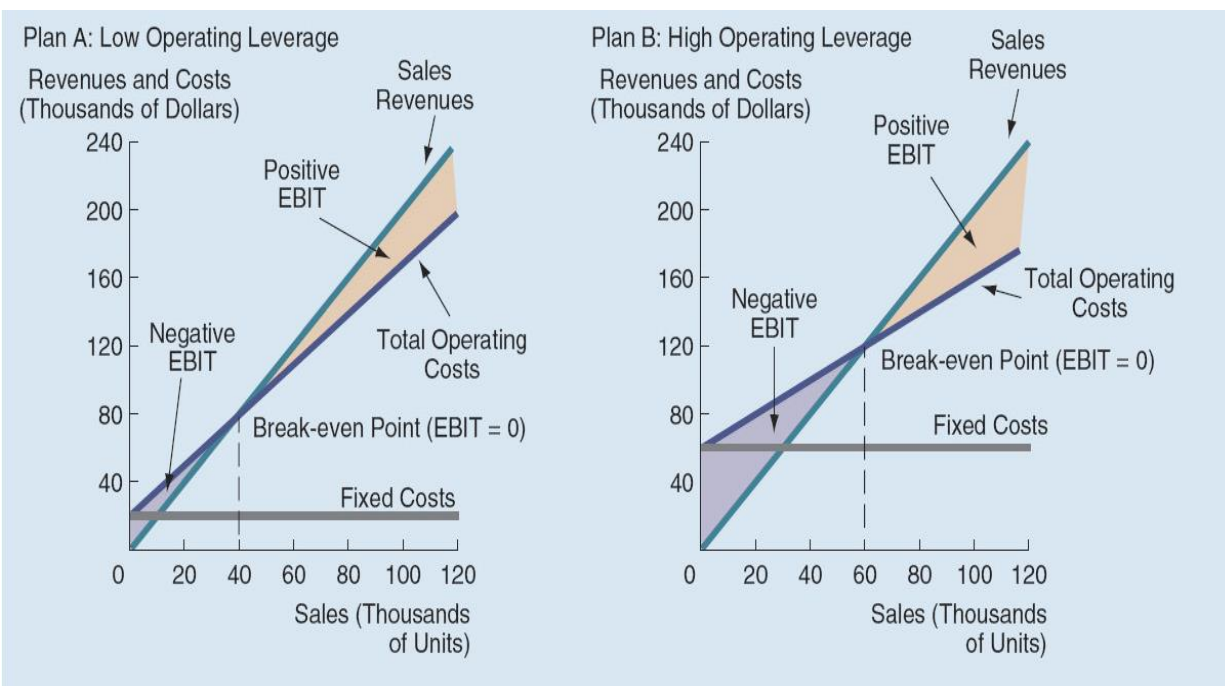
B. Financial Risk: which is the additional risk placed on the common stockholders as a result of the firm's decision to use debt.

Business Risk

Business risk occurs when sales are reduced and costs are increased, in both cases EBIT will negatively affect.

(The higher the operating leverage the higher the business risk)

Operating Leverage:



Good Year

Bad Year

Break Even Point

$$\text{EBIT} = \text{Zero} = \text{PXQ} - \text{VXQ} - \text{FC} = 0$$

$$\text{PQ} - \text{VQ} = \text{FC}$$

$$\text{Q} (\text{P} - \text{V}) = \text{F}$$

$$\text{Q}_{\text{BE}} = \frac{\text{FC}}{\text{P} - \text{V}}$$

Example

	Good Year	Bad Year
Price	\$2.00	\$2.00
Variable costs	\$1.50	\$1.00
Fixed costs	\$20,000	\$60,000
Capital	\$200,000	\$200,000
Tax rate	40%	40%

Answer

1- Good Year

$$Q_{BE} = \frac{FC}{P-V}$$

$$Q_{BE} = \frac{20,000}{2-1.50} = 40,000$$

2- Bad Year

$$Q_{BE} = \frac{60,000}{2-1} = 60,000$$

	Good Year	Bad Year
Sales @ Break Even	80,000	120,000
(-) VC	60,000	60,000
(-)FC	20,000	60,000
EBIT	ZERO	ZERO

The higher the operating leverage the higher the business risk

Financial Risk

Financial risk is the additional risk placed on the common stockholders as a result of the decision to finance the firm with debt, suppose ten people decide to form a corporation there is a certain amount of business risk in the operation. If the firm is capitalized only with common equity, and if each person buys 10 % of the stock, then each investor shares equally in the business risk. Suppose the firm is capitalized with 50% debt and 50% Equity, with five of the investors putting up their capital as **debt** and the other five putting up their money as equity. In this case, the five investors who put up the equity will have to bear all of the business risk, so the common stock will be twice as risky as it would have been had the firm been financed only with equity. Thus, the use of debt, or financial leverage, concentrates the firm's business risk on its stockholders. This concentration of business risk occurs because debt holders, who receive fixed interest payments, bear none of the business risk.

Estimating the Optimal Capital Structure

Managers should choose the capital structure that maximizes shareholders' wealth. The basic approach is to consider a trial capital structure, based on the market values of the debt and equity, and then estimate the wealth of the shareholders under this capital structure. This approach is repeated until an optimal capital structure is identified.

There are five steps for the analysis of each potential capital structure:

- (1) Estimate the interest rate the firm will pay.
- (2) Estimate the cost of equity.
- (3) Estimate the weighted average cost of capital.
- (4) Estimate the free cash flows and their present value, which is the value of the firm.
- (5) Deduct the value of the debt to find the shareholders' wealth, which we want to maximize.

Example

Schweser Satellites Inc. produces satellite earth stations that sell for \$100,000 each. The firm's fixed costs, F , are \$2 million; 50 earth stations are produced and sold each year; profits total \$500,000; and the firm's assets (all equity financed) are \$5 million. The firm estimates that it can change its production process, adding \$4 million to investment and \$500,000 to fixed operating costs. This change will

- (1) Reduce variable costs per unit by \$10,000
- (2) increase output by 20 units
- (3) But the sales price on all units will have to be lowered to \$95,000 to permit sales of the additional output.

The firm has tax loss carry-forwards that cause its tax rate to be zero, its cost of equity is 15 percent, and it uses no debt.

A. Should the firm make the change?

B. Would the firm's operating leverage increase or decrease if it made the change?

What about its breakeven point?

C. Would the new situation expose the firm to more or less business risk than the old one?

Answer

	Old	New
Assets	5,000,000	9,000,000
Fixed Cost	2,000,000	2,500,000
VC	?	Reduction (10,000)
No. of Units	50	70
Price per Unit	100,000	95,000

(A)

Determine the variable cost per unit at present, V :

$$\text{Profit} = \text{Sales} - (\text{FC} + \text{VC})$$

$$\$500,000 = (\$100,000) (50) - (\$2,000,000 + V (50))$$

$$50(V) = \$2,500,000$$

$$\text{VC Per unit} = \$50,000$$

$$\text{VC for New} = 50,000 - 10,000 = 40,000$$

(2) Determine the new profit level if the change is made:

$$\text{New profit} = \text{Sales} - (\text{FC} + \text{VC})$$

$$= \$95,000(70) - (\$2,500,000 + 40,000 \times 70)$$

$$= \$1,350,000$$

(3) Determine the change in Profit (incremental profit)

$$\text{Profit} = \$1,350,000 - \$500,000 = \$850,000$$

Estimate the approximate rate of return on new investment:

$$\text{Return} = \text{Profit} / \text{Investment} =$$

$$\$850,000 / \$4,000,000 = 21.25\%$$

Since the return exceeds the 15 % cost of equity, this analysis suggests that the firm should go ahead with the change.

$$\text{Return} > \text{WACC} \quad 21.25\% > 15\%$$

(B)

The change would increase the breakeven point:

$$\text{Old: } Q_{BE} = \frac{\text{FC}}{P - V} = \frac{2,000,000}{100,000 - 50,000} = 40 \text{ Units}$$

$$\text{New: } Q_{BE} = \frac{2,500,000}{95,000 - 40,000} = 45.45 \text{ Units}$$

(C)

Since a higher breakeven point, other things held constant, is more risky. Also the percentage of fixed costs increases

$$\text{OL} = \text{FC} \div \text{Total Cost}$$

$$\text{OL old} = 2,000,000 \div 4,500,000 = 44.44\%$$

$$\text{OL new} = 2,500,000 \div 5,300,000 = 47.17\%$$

The change in breakeven points and also the higher percentage of fixed costs suggests that the new situation is more risky.

Types of Hybrid Securities

1. Preferred stock
2. Warrants
3. Convertibles

Preferred Stock

1. Preferred dividends are specified by contract, but they may **be omitted without placing the firm in default.**
2. Most preferred stocks prohibit the firm from paying common dividends when the preferred is in arrears.
3. Preferred stock has no voting rights.

Advantages

- Dividend obligation not contractual (Will not lead the company to bankruptcy)
- Avoids dilution of common stock (that occur when common stock sold)
- Avoids large repayment of principal (since there is no maturity)

Disadvantages

- Preferred dividends not tax deductible, so typically costs more than debt
- Increases financial leverage, as well as financial risk since preferred dividends is considered as fixed cost.

Warrants

A warrant is a certificate issued by a company that gives the holder the right to buy a stated number of shares of the company's stock at a specified price for specific time. Generally warrant is issued with debt.

For example

When informatics corporation rapidly growing , company wanted to sell \$50 million of 20-years bonds in 2004 , The investment bankers informed the financial vice-president that the bonds would be difficult to sell at rate 8% since market required rate of return at 10% , however he suggest that investor might be willing to buy the bond with a coupon rate 8% if the company would offer 20 warrants with each \$1000 bond , and each warrant will entitle the holder to buy one share at exercise price of \$22 per share , the stock was selling for \$20 per share at that time noting that warrant will be expire on 2014.

$$PV = \frac{80}{(1.10)^1} + \frac{80}{(1.10)^2} + \dots + \frac{80}{(1.10)^{20}} + \frac{1000}{(1.10)^{20}}$$

$$PV = 80 \times 8.51356 + 1000 \times 0.14864 = 681.08 + 148.64 = 829.72 \approx 830$$

$$\text{Warrants value} = 1000 - 830 = \$170$$

$$\text{One warrant} = 170 / 20 = \$8.50$$

Options

Is a contract between 2 parties buyer and seller, this contract gives the buyer the right but not obligation to buy or sell and underlying asset sometime in the future at price known today and for this right the buyer has to pay premium.

- **Call Option:** the right to buy
- **Put option:** the right to sell
- **European Option:** An option that can only exercise at the end of its life
- **American Option:** an option that can be exercised anytime during its life, since the investor has the freedom to exercise the option any time, the American option is more valuable than the European option.

	In The Money	At The Money	Out of The Money
Call Option	Market Price > Exercise Price	Exercise Price = Market Price	Market Price < Exercise Price
Put Option	Exercise Price > Market Price	Exercise Price = Market Price	Exercise Price < Market Price

Call option is similar to warrant

Both give the investor the right to buy a share of stock at exercise price before expiration date.

Difference between Call option and Warrants

However there are major differences between call options and warrants, when call options are exercised the stock provided to the option holder comes from the secondary market , but when warrants are exercised the stock provided by newly issued shares or treasury stock (that company has previously purchased).

Also call option has a life of just few months, while warrants have lives of ten years or more.

Example

What is the bond value must be set on the following bond with warrants if the total package is to sell for \$1,000? $P_0 = \$20$. , 20-year annual payment bond without warrants = 10%. - 45 warrants with a strike price (also called an exercise price) of \$25 each are attached to bond. Each warrant's value is estimated to be \$3.

Answer

$$V_{\text{Package}} = V_{\text{Bond}} + V_{\text{Warrants}} = \$1,000.$$

$$V_{\text{Warrants}} = 45(\$3) = \$135.$$

$$V_{\text{Bond}} + \$135 = \$1,000$$

$$V_{\text{Bond}} = \$865$$

Assume that after the issuing the warrants immediately sell for \$5 each, what would this imply about the value of the package?

$$\text{New value of the package} = \$865 + 45(\$5) = \$1,090.$$

This is \$90 more than the selling price, therefore the company may set lower interest payments who's PV would be smaller by \$90, or it could have offered fewer warrants and/or set a higher strike price

- The cost of the bond with warrants package is higher than the cost of straight debt because part of the expected return is from capital gains, which are riskier than interest income.
- The cost is lower than the cost of equity because part of the return is fixed by contract.

Convertibles

Convertibles securities are bonds or preferred stocks that under specified terms and conditions can be exchange for common stock at the option of the holder.

Conversion Ratio

Number of shares of stock a bondholder will receive upon conversion. The conversion price is typically set 20% to 30% above the market price of the common stock. And conversion price and conversion ratio are fixed during the life of the bond.

Convertible have 2 advantages from the issuer's point view

1. Bond with warrants offers the company to sell debt with low interest rate.
2. Convertible provide a way to sell common stock at prices higher than the market.

How Can Company is sure that conversion will occur?

If the price of the stock rises above the conversion price, the company start call the bond since all convertible bonds are typically callable.

For example assume that company issued a bond at par worth for \$1000, and convertible to 20 stocks, while the current stock price in the market is \$60, the company starts to call the bond at rate \$1050. Therefore bondholder will select to convert his bond into shares cause he will receive $20 \times 60 = \$1200$ instead of \$1050.

Example

Assume the firm's tax rate is 40% and its debt ratio is 50%. Now suppose the firm is considering either:

- (1) Issuing convertibles at rate 8.71%
- (2) Issuing bonds with warrants @ 10%

Its new target capital structure will have 40% straight debt, 40% common equity at cost 13.40 % and 20% convertibles or bonds with warrants. What effect will the two financing alternatives have on the firm's WACC?

Answer:

WACC with convertible

Equity		Debt		Convertible
$(40\% \times 13.40\%)$	+	$(40\% \times 10\% \times 60\%)$	+	$(20\% \times 8.71\%)$
$5.36\% + 2.40\% + 1.74\% = 9.50\%$				

WACC Without convertible

Equity		Debt
$(50\% \times 13.40\%)$	+	$(50\% \times 10\% \times 60\%)$
$6.70\% + 3\% = 9.70\%$		

Differences between warrants and convertibles

- Most convertibles are callable, while warrants are not.
- Warrants typically have shorter maturities than convertibles
- Warrants usually provide for fewer common shares than do convertibles.
- Bonds with warrants typically have much higher flotation costs than do convertible issues.

Conclusion

1. Company with good future prospects can issue stock “through the back door” by issuing convertible bonds to avoid any negative signal of issuing stock directly. Also company with low risk rating might issue convertible with lower interest.
2. There are pros and cons to the use of convertible bonds as a means of financing by corporations.
 - One of several advantages of this delayed method of equity financing is a delayed dilution of common stock and earnings per share (EPS).
 - Another is that the company is able to offer the bond at a lower [coupon](#) rate - less than it would have to pay on a straight bond.
 - The more valuable the conversion feature, the lower the coupon Rate that must be offered to sell the bond; the conversion feature is a sweetener. Regardless of how profitable the company is.